

THE CERCERIS SPECIES OF JAVA (HYMENOPTERA SPHECOIDEA)

by

J. VAN DER VECHT

Rijksmuseum van Natuurlijke Historie, Leiden

The genus *Cerceris* Latreille contains several hundreds of species and is represented in all zoological regions, in temperate areas as well as in the tropics and subtropics. In 1942 Arnold stated that about 650 specific names had been proposed in this genus; since then another 125 new species have been described.

The species of certain parts of the world are well known. In recent years De Beaumont (1950, 1951, 1958) and others have published some important revisions of the species of Europe and North Africa, while Tsuneki (1961) studied the species of North Eastern Asia (for further references see pp. 19-21 of Tsuneki's paper). The Ethiopian *Cerceris* have been monographed by Brauns (1926) and by Arnold (1931, 1942). The species of the Nearctic region have been studied for several years by Prof. H. Scullen, who informed me that an extensive revision will appear in 1964.

Obviously it would be of considerable interest to study the relationships within this genus from a worldwide point of view. Unfortunately, this is still far from possible, mainly on account of our insufficient knowledge of the species of South America and of the Oriental and Australian regions. As regards the Oriental region, the only more comprehensive paper is Turner's revision (1912) of the species inhabiting the former British India; it deals with 61 species, including 22 new ones. The *Cerceris* species of the Indo-Australian archipelago have never been revised, and our knowledge of this subject consists of no more than about 30 separate descriptions, many of which are very incomplete.

The present paper on the Javan *Cerceris* is a first attempt towards improvement of this situation; I hope that it may be followed by similar studies of the species of other islands, and ultimately by a comprehensive review. The Javan fauna was selected for this first study because the Leiden Museum possesses a rich collection of *Cerceris* from this island, including some types of the species described by Maidl (1926). This author recorded eight species from Java, seven of which he described as new. Since two of these

have proved to be the sexes of one species, the actual number of Javan species known to Maidl is seven. In addition, the present paper deals with three species originally described from Malaya (*C. kedahae*), Sumatra (*C. tridentata*) or Borneo (*C. latidens*), and with six new species.

I take pleasure in dedicating two of the new species to Professor Dr. Hilbrand Boschma, in recognition of his outstanding contributions to our knowledge of the Indo-Australian fauna.

The bionomics of *Cerceris* are of particular interest, because some species are predators of bees, whereas the majority of the species store beetles in their cells, as a rule Curculionidae (and Bruchidae), but in some cases Buprestidae or Chrysomelidae. The main types of prey selection have been found throughout the old world. In the European species the ethological differences are at least to a certain extent correlated with morphological characters (see De Beaumont, 1950, p. 29), but it is still uncertain whether this generalization also holds for the Oriental and the Ethiopian species. Judging from the structural characters, one would expect the first three species discussed below to be predators of bees, but the prey of *C. umbinifera* is not yet known; the remaining species should store beetles in their cells, but this has been ascertained only in the case of *C. hilbrandi*, which preys on Curculionidae.

Unless otherwise stated, the material recorded in this paper is preserved in the Rijksmuseum van Natuurlijke Historie, Leiden.

The figures have been drawn by Mr. W. Bergmans under the supervision of the author.

It should be noted that the characters given in the key to the species are not repeated in the descriptions of the new forms.

Key to the females

1. Hind coxae with sharp longitudinal carina on inner side 2
- Hind coxae without longitudinal carina 9
2. Clypeus with projecting lamina, or with two flat teeth projecting above the apical margin 5
- Clypeus flattened or depressed anteriorly, without projecting lamina or teeth 3
3. Supraclypeal area strongly convex, as seen in profile distinctly raised above the level of the interantennal carina. Basal area of propodeum at least partly smooth, usually with traces of transverse striation in the median furrow. (Second gastral sternite with basal platform) *C. pictiventris* Dahlbom
- Supraclypeal area at most slightly convex, in profile not more prominent than the interantennal carina. Propodeal area rugose 4
4. Second gastral sternite on each side at base with short carina, which in profile forms a low bluntly projecting tooth, but without basal platform. Basal half of clypeus strongly convex, the anterior part not strongly impressed. Propodeal area irregularly rugose *C. umbinifera* Maidl
- Second gastral sternite with distinct basal platform. Clypeus moderately convex,

the median portion strongly transversely impressed near the apical margin. Propodeal area regularly rugose, on each side with 7-8 longitudinal ridges

C. kedahae Pagden

5. Sixth gastral sternite with apical and lateral teeth. Second gastral sternite with basal platform. (The two teeth on inner side of mandibles small, blunt, and subequal. First gastral segment longer than wide. Lamina of clypeus shallowly, angularly, emarginate anteriorly). 6
- Sixth gastral sternite without lateral teeth. Second gastral sternite without a basal platform, at most (in *C. varia*) the basal part of the sternite somewhat more convex than the adjoining areas 7
6. Basal platform of second gastral sternite indistinctly defined posteriorly. Lamina of clypeus slightly wider and more deeply emarginate than in the following species. Gaster black with yellow markings (fig. 2); in specimens from East Java the first segment sometimes red *C. trimaculata* Moidl
- Basal platform of second gastral sternite rather sharply defined posteriorly, in profile the end distinctly angular. Lamina of clypeus narrower and less deeply emarginate. Gastral segments 1 and 6 and the greater part of 2 ferruginous-red. Punctuation slightly coarser; yellow markings more extensive *C. variaesimilis* Moidl
7. First gastral segment longer than wide. Apical teeth of sixth gastral sternite broad, rounded at apex, distinctly divergent. Lamina of clypeus divided into two flat, obliquely truncate teeth (fig. 1) close to the anterior margin; mandibles with two teeth on inner side, the distal tooth distinctly larger than the proximal one
- C. varia* Moidl
- First gastral segment wider than long. Apical teeth of sixth sternite narrower, parallel. Lamina of clypeus emarginate at apex, but its anterior margin not interrupted; teeth on inner side of mandibles small and blunt, the distal tooth not conspicuously larger than the other one 8
8. Lamina of clypeus emarginate, its sides only slightly converging anteriorly. Gastral tergites 3 and 5, and sternite 3, with complete yellow band, the others at most with indistinct traces of yellow markings. Coxae, trochanters, and greater part of femora black *C. roepkei* Moidl
- Lamina of clypeus more deeply emarginate, its sides more strongly converging (fig. 1). Markings of gastral tergites different (fig. 2); sternite 3 with yellow band which is more or less widely interrupted in the middle. Legs ferruginous with some yellow markings, coxae and tibiae partly infuscated, hind tarsi fuscous
- C. boschmai* sp. n.
9. Sixth gastral sternite with apical and lateral teeth and with a more or less distinct pencil of long hairs near or under each lateral tooth 10
- Sixth gastral sternite with only the two apical teeth (which in one species are rather broad) and with a pencil of hairs on each side of these teeth 12
10. Clypeus with lamina arising from the base; the lamina emarginate at apex 11
- Clypeus with three apical teeth arising at a short distance from the apex; anterior margin of clypeus with a median group of three small and blunt teeth, and another small blunt tooth on each side of this group at a somewhat greater distance. Mandibles only very bluntly dentate on inner side *C. lucti* sp. n.
11. Anterior margin of clypeus with a rather regular row of five teeth. Mesoscutum dull, very finely punctate, with a tendency to longitudinal striation; the interspaces smaller than the punctures. Gastral tergites with only a very fine basic punctuation, the first and second distinctly shiny, the others rather dull
- C. vulcanica* sp. n.
- Anterior margin of clypeus with three distinct and rather long teeth, and with some small blunt denticles between and beyond these teeth. The finer punctuation of the mesoscutum intermixed with several coarse and oblong punctures. Gastral tergites with distinct coarse punctures (generally smaller than the interspaces) in addition

- to the fine basic puncturation *C. pseudotridentata* Maidl
12. Clypeus with broad and strongly projecting lamella, which arises directly from the base; it is broadest at the apex, which is truncate with a narrow and deep median incision (fig. 1). Area of propodeum transversely, at base obliquely, striate, the interspaces very shallowly punctate. Mandibles with pronounced tooth on inner side *C. latidens* Cameron
- Clypeus at most with a moderately projecting lamina which ends close to the apical margin 13
13. Gastral petiole distinctly longer than wide 1), and much wider than high. Clypeus with moderately raised lamina, arising from near the middle and shallowly emarginate at apex; apical margin of clypeus tridentate in the middle. Area of propodeum finely transversely striate. Gastral tergites 1-3 with scattered coarse punctures (the base of 2 and 3 almost impunctate), 4 and 5 with shallow coarse punctures near the apical margin and on the sides *C. tridentata* Maidl
- Gastral petiole wider than long; clypeus different. Eyes rather strongly diverging towards the clypeus 14
14. Mesepisternum produced into a sharp tooth. Clypeus with a short and slightly projecting lamina, arising below the middle, narrowed towards the apex which is arcuately truncate with rounded angles; anterior margin of clypeus with some short and blunt teeth. Basal area of propodeum with some oblique striae on anterior half, posteriorly with a few transverse striae. Head strongly produced behind the eyes; the posterior ocelli about three times as far from the occiput as from each other *C. radjamandalae* sp. n.
- Mesepisternum normal, not dentate. Clypeus divided by an irregular, transverse, arcuate ridge into a basal portion which is slightly concave, and an anterior more strongly concave part which is produced into a narrow, truncate, lamina in the middle; there is a small tooth on each side about halfway between the median lamina and the end of the transverse ridge (fig. 1). Basal area of propodeum longitudinally striate. Head much less produced behind the eyes, posterior ocelli less than twice as far from the occiput as from each other *C. hilbrandi* sp. n.

Key to the males

1. Hind coxae with sharp longitudinal carina on inner side 2
- Hind coxae without longitudinal carina 9
2. Supraclypeal area strongly convex, as seen in profile distinctly projecting above the level of the interantennal carina. Basal area of propodeum smooth, with some punctures in the median furrow and in the lateral furrows. Second gastral sternite with well defined basal platform *C. pictiventris* Dahlb.
- Supraclypeal area evenly convex or flat, not higher than the adjoining part of the interantennal carina. Propodeal area more or less rugose 3
3. Second gastral sternite at base with more or less distinctly defined platform (least distinct in *C. roepkei* which has a yellow band on tergites 3 and 6, see fig. 2) 4
- Second gastral sternite at base on each side with a low tubercle or angularly projecting carina, the surface between these projections at most very slightly raised, a platform not delimited posteriorly 7
4. Basal area of propodeum longitudinally striate. First gastral segment wider than long. Clypeus arcuately truncate at apex. Gaster densely and coarsely punctate *C. kedahae* Pagden
- Basal area of propodeum irregularly rugose. First gastral segment at least as long as wide. Apical margin of clypeus very bluntly tridentate 5
5. First gastral segment hardly longer than wide. Second tergite without yellow spot

1) Very probably the ♀ of *C. bantamensis* will prove to belong here.

- at base. Face below antennae entirely covered with short, moderately conspicuous, pale golden pubescence *C. roepkei* Moidl
- First gastral segment distinctly longer than wide. Second tergite with transverse yellow spot at base. Pubescence of face very sparse in upper part, but very dense and conspicuous on the antero-lateral areas of the median lobe and on the lateral lobes of the clypeus 6
6. Basal platform of second gastral sternite sharply defined. Gastral petiole and part of the second segment ferruginous-red. Antennae ferruginous. Pronotum with two large yellow spots *C. variaesimilis* Moidl
- Basal platform of second gastral sternite indistinctly delimited posteriorly. Gastral petiole black; second tergite black, with three yellow spots. Antennae fuscous above. Pronotum black or with small yellow spots *C. trimaculata* Moidl
7. Second gastral sternite impunctate in the middle and with only a few scattered punctures on the sides. First to third gastral tergites densely and coarsely punctate, the punctures well defined and larger than the interspaces. (Clypeus strongly convex, black, as a rule with central yellow spot (absent in 2 out of 13 ♂♂); supra-clypeal area black; pronotum with two yellow spots, postscutellum with yellow band; tegulae translucent brown with yellow spot at anterior margin; markings on gaster: fig. 2) *C. umbinifera* Moidl
- Second gastral sternite distinctly punctate in the middle as well as on the sides, the punctures generally irregular and not well defined 8
8. First gastral segment about as long as wide, the tergite strongly convex. Supra-clypeal area densely punctate. First gastral tergite densely and coarsely punctate (in the middle with a few large interspaces), the following tergites more sparsely punctate and their punctures smaller and shallower. (Markings of head and thorax as in *C. umbinifera*, but clypeus with large yellow spot at base and tegulae with yellow band on outer side; markings on gaster: fig. 2) *C. boschmai* sp. n.
- First gastral segment longer than wide (7 : 5), the tergite much less strongly convex lengthwise. Supraclypeal area with only a few punctures. Puncturation of tergites 1-4 uniform and fairly coarse and dense, but the punctures shallower, slightly smaller and less distinctly defined than in *C. umbinifera*. (Clypeus yellow, supra-clypeal area with median yellow stripe, band on pronotum narrowly interrupted, tegulae yellow with translucent margin and dark base, scutellum with more or less developed yellow mark, postscutellum with yellow band, first gastral segment often mainly red; markings on gaster: fig. 2) *C. varia* Moidl
9. Lateral fringes at anterior margin of clypeus close together, separated in the middle by the bluntly tridentate and projecting part of the clypeus; this part, measured along the anterior margin, is only about half as long as each fringe. (Mesoscutum dull, finely rugose and moreover coarsely punctate, the large punctures shallow and irregular. Basal area without median furrow, somewhat indistinctly, finely, obliquely, striate, with transverse striae at apex; the interspaces more or less distinctly punctate; dorsal lateral areas densely and rugosely bipunctate, the punctures partly coarse and many times larger than those which form the fine basic puncturation. First gastral segment (see fig. 4) somewhat flattened above, its greatest width about 1½ times its height. The anterior gastral tergites dull, rather densely and coarsely punctate (except at the base of each tergite) and moreover with fine basic puncturation; the posterior segments more sparsely and superficially punctate. Face black with narrow yellow lines at inner orbits, a mark on the interantennal carina and indistinct spots (variable?) on the clypeus; markings on gaster: fig. 4) *C. latidens* Cameron
- Lateral fringes at anterior margin of clypeus far apart. (Clypeus entirely or mainly yellow) 10

10. Basal area of propodeum smooth and shiny or partly finely transversely striate, in some species distinctly finely punctate. Dorsal lateral areas of propodeum more or less shiny, not coarsely sculptured 11
 — Basal area of propodeum more or less coarsely longitudinally striate. Dorsal lateral areas of propodeum either densely rugoso-punctate, or with very large shallow punctures 14
11. Gastral tergites with fine and dense basic puncturation, only laterally with some ill-defined and shallow larger punctures. Mesoscutum dull, densely and finely rugosely punctate. (Yellow markings: fig. 3) *C. vulcanica* sp. n.
 — Gastral tergites coarsely punctate on the fine basic puncturation. Mesoscutum moderately shiny, finely rugosely punctate and moreover with some more or less distinct larger punctures 12
12. Gastral petiole less than twice as long as wide (9 : 5). Vertex with two large subtriangular spots behind the ocelli; temples with yellow stripe along outer orbits. Scutellum with broad yellow band *C. tridentata* Maidl
 — Gastral petiole nearly $2\frac{1}{2}$ times as long as wide. Vertex black; temples black or with small yellow spot. Scutellum with two spots of variable size 13
13. Coarser puncturation of mesoscutum sparse, superficial and indistinct. Yellow spots on pronotal collar far apart; second gastral tergite with yellow band at base, extending along the sides to the posterior margin; second sternite brownish on basal half, with some indistinct yellowish blotches at extreme base, apical half with two large yellow spots *C. lucti* sp. n.
 — Coarser puncturation of mesoscutum more pronounced and distinct. Pronotal collar with yellow band, narrowly interrupted in the middle. Second gastral tergite with transverse yellow spot at base, the sternite yellow, except for a large triangle in each apical angle and a narrow band in front of the depressed apical margin.
C. pseudotridentata Maidl
14. Apical antennal segment very slightly curved. Mesoscutum dull, densely, reticulately and finely, punctate; basal area of propodeum convex, finely longitudinally striate. (First gastral segment about as long as wide, the tergite strongly convex; all tergites rather dull, finely and very densely, rugosely, punctate. Colour pattern: fig. 4)
C. hilbrandi sp. n.
 — Apical antennal segment strongly curved. Mesoscutum less dull, rather coarsely, rugosely, punctate; basal area of propodeum not unusually convex, coarsely striate. (Gastral segments rather shiny, with microscopically fine puncturation) . . . 15
15. First gastral segment much longer than wide (5 : 3). Antennal segments 9-13 at under side with an oval, strongly shiny, concavity. Dorsal lateral areas of propodeum with large, round to oval, shallow punctures, each puncture with some minute ridges on the flat bottom, the interspaces much smaller than the punctures. Seventh gastral sternite simple *C. bantamensis* sp. n.
 — First gastral segment hardly longer than wide. Only antennal segments 12 and 13 with oval impression, which is shallower and less sharply defined than in *C. bantamensis*. Dorsal lateral areas of propodeum densely and coarsely punctate, the interspaces narrow and with a pronounced tendency to form irregular longitudinal striae. Seventh gastral sternite arcuately emarginate at apex, with a pre-apical transverse arcuate ridge, which is weakly developed in the middle, but forms on each side a bluntly projecting tubercle bearing a tuft of very short dark hairs. Eighth sternite on each side with a tuft of slightly longer, pale brownish, hairs
C. radjamandalae sp. n.

***Cerceris pictiventris pictiventris* Dahlbom (fig. 2)**

Cerceris pictiventris Dahlbom, 1845, Hym. Eur., vol. 1, p. 498, ♀ — "Java" (Naturh. Riksmus. Stockholm) [I have examined the type in 1948].

Cerceris malayana Cameron, 1903, Jl. Straits Br. As. Soc., vol. 39, p. 162, ♂ — "Kuching, Sarawak", Borneo (Brit. Mus., London). Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 236 (description of ♀; Sumatra; Java).

Bionomics. — A common species, occurring in cultivated areas in the plains and on mountain slopes up to about 900 m (Idjen Mountains). Most of the specimens collected in Java were found flying around shrubs in the sunshine; a few females were taken on flowers of *Antigonon* (Bogor, Aug. 1932). No data are available on the prey of the Javan subspecies, but very probably it will prove to agree in this respect with the Formosan subspecies, which according to Iwata (1939) provisions its cells with bees of the genus *Halictus*.

Material. — 16 ♀ and 38 ♂ from several localities in Java.

Distribution. — *C. pictiventris* is a widely distributed polytypic species; it occurs throughout the Oriental region and goes eastwards to New Guinea and the Solomon Islands. The Javan form also inhabits Sumatra and Borneo; some other subspecies are *C. pictiventris novarae* Saussure, 1867, from India and Ceylon, *C. p. formosicola* Strand, 1913, from Formosa, *C. p. praedata* Smith, 1861, from the Northern Moluccas (new status), and *C. p. immolator* Smith, 1864, from the Papuan area (new status) (= *C. p. papuana* Cameron, 1906, new synonym).

***Cerceris kedahae* Pagden (fig. 2)**

Cerceris kedahae Pagden, 1934, Jl. Fed. Mal. St. Mus., vol. 17, p. 467, ♀ ♂, figs. 1-3 — "Kedah Peak, Malaya" (Brit. Mus., London; type ♀); also recorded from Cameron Highlands and Taiping Hills.

Bionomics. — A rather rare inhabitant of mountain forests. In Malaya Pagden (1934) observed as prey the bees *Halictus burmensis* Blüthgen and *H. reticulosus* Dalla Torre.

Material. — West Java, Djampang, 1 ♀ Mt. Malang, 3000 ft., Febr. 1935, 2 ♀ Tjiguha, January and May 1938, Mrs. M. E. Walsh. Furthermore the Leiden Museum possesses 1 ♀ and 1 ♂ from Malaya (paratypes, leg. Pagden) and 4 ♀ from Sumatra.

Distribution. — Malaya; Sumatra; West Java.

***Cerceris umbinifera* Maidl (fig. 2)**

Cerceris umbinifera Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 229, ♀ ♂, figs. 18-22 — "Java, Schmiedeknecht, 1902" (3 ♀ Naturhist. Mus. Vienna), "Sumatra, Kur, VII-1915, Edw. Jacobson" (1 ♀ Mus. Leiden); ♂ ♂ from Java and Sumatra in Mus. Vienna, coll. Roepke (Wageningen) and Mus. Leiden [most of the males associated with the female by Maidl belong to *C. roepkei* Maidl (3 ♂ from Java in coll. Roepke, Wageningen, and 3 ♂ from Simalur Island, Sumatra, in Mus. Leiden)].

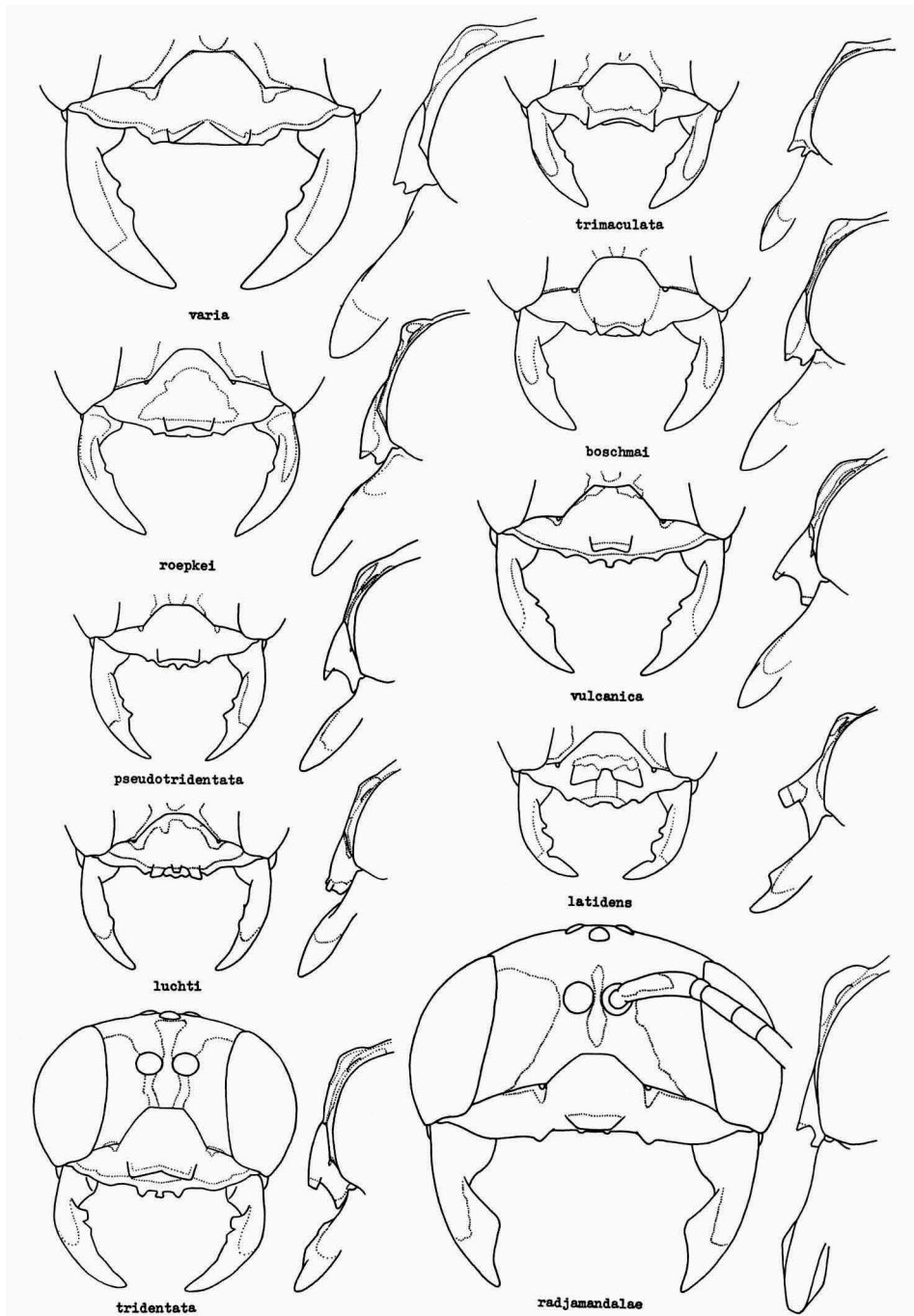


Fig. 1. Frontal and lateral aspects of head (in most drawings certain parts omitted) of various *Cercheris* species. Yellow markings are indicated by dotted lines.

Bionomics. — In cultivated areas (rare!) and in light forests on mountain slopes, in Java from 250 to 1200 m. Prey unknown.

Material. — West Java, 2 ♀, 2 ♂ Bogor, 250 m, M. A. Lieftinck; 1 ♀, 5 ♂ Tapos on Mt. Gedeh, 700-800 m, 1932 and 1933, J. van der Vecht; 1 ♀ Mt. Pantjar near Bogor, 300 m, 27 Sept. 1936, J. van der Vecht; 2 ♂ Djampang Tengah, 1934, 1 ♂ Mt. Benteng, March 1938, Mrs. M. E. Walsh; 1 ♂ Sukabumi, 500 m, 1933, F. A. Th. H. Verbeek. — East Java, 1 ♂ Nongkodjadar, 1200 m, Aug. 1935, J. G. Betrem. — The Leiden Museum possesses a single ♂ from South Sumatra (Mt. Tanggamus, July-Aug. 1935, Mrs. M. E. Walsh).

Distribution. — Sumatra; Java.

***Cerceris varia* Maidl (figs. 1, 2)**

Cerceris varia Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 222, ♀, figs. 4 and 5 — "Java, Schmiedeknecht, 1902" (type ♀, Naturh. Mus. Vienna).

Cerceris obtusedentata Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 235, ♂ — "Java, Schmiedeknecht, 1902" (type ♂, Naturh. Mus. Vienna) [new synonym].

The colour pattern is usually as shown in fig. 2, but most of the specimens collected in the lowlands of South Sumatra and of West Java show a tendency towards melanism (gastral petiole more or less extensively black, etc.).

Bionomics. — This species appears to be common in certain low mountain areas, where it occurs in secondary forest-like vegetation; in the lowlands it is much less numerous.

Material. — 1 ♀ Java, Kuhl & van Hasselt; 1 ♂ Java, leg. Piepers. — West Java, 1 ♀ 1 ♂ Banten, Tjilegon, 9 June 1932, J. van der Vecht; 1 ♂ Batavia (= Djakarta), Nov. 1907, E. Jacobson; 2 ♂ Depok, 25 Febr. 1933, M. A. Lieftinck; 1 ♂ Bogor, Tjilendek, 250 m, 7 Oct. 1953, J. van der Vecht; extensive series from Tapos on Mt. Gedeh, 700-800 m, 1933-4, Indonesian collector; 2 ♂ Sukanegara, 22 Sept. 1935, J. van der Vecht. — Central Java, 1 ♂ Merbuh, Bodja, 300 m, 9 Febr. 1941, Mrs. M. E. Walsh.

Distribution. — Java and South Sumatra. I have seen very similar forms, which are perhaps only subspecifically distinct, from India, Burma, Northern Sumatra and Sumba.

***Cerceris trimaculata* Maidl (figs. 1, 2)**

Cerceris trimaculata Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 234, ♂, figs. 30, 31 — "Java, Schmiedeknecht" (type ♂, Naturh. Mus. Vienna). Schulthess, 1935, Rev. Suisse Zool., vol. 42, p. 305 (1 ♀ 1 ♂ Buitenzorg (= Bogor), Java).

The first gastral segment is usually black, but it is red in two females from Malang; these specimens resemble *C. variaesimilis*, but they differ in the characters given in the key and in having the antennae fuscous above, ferruginous beneath.

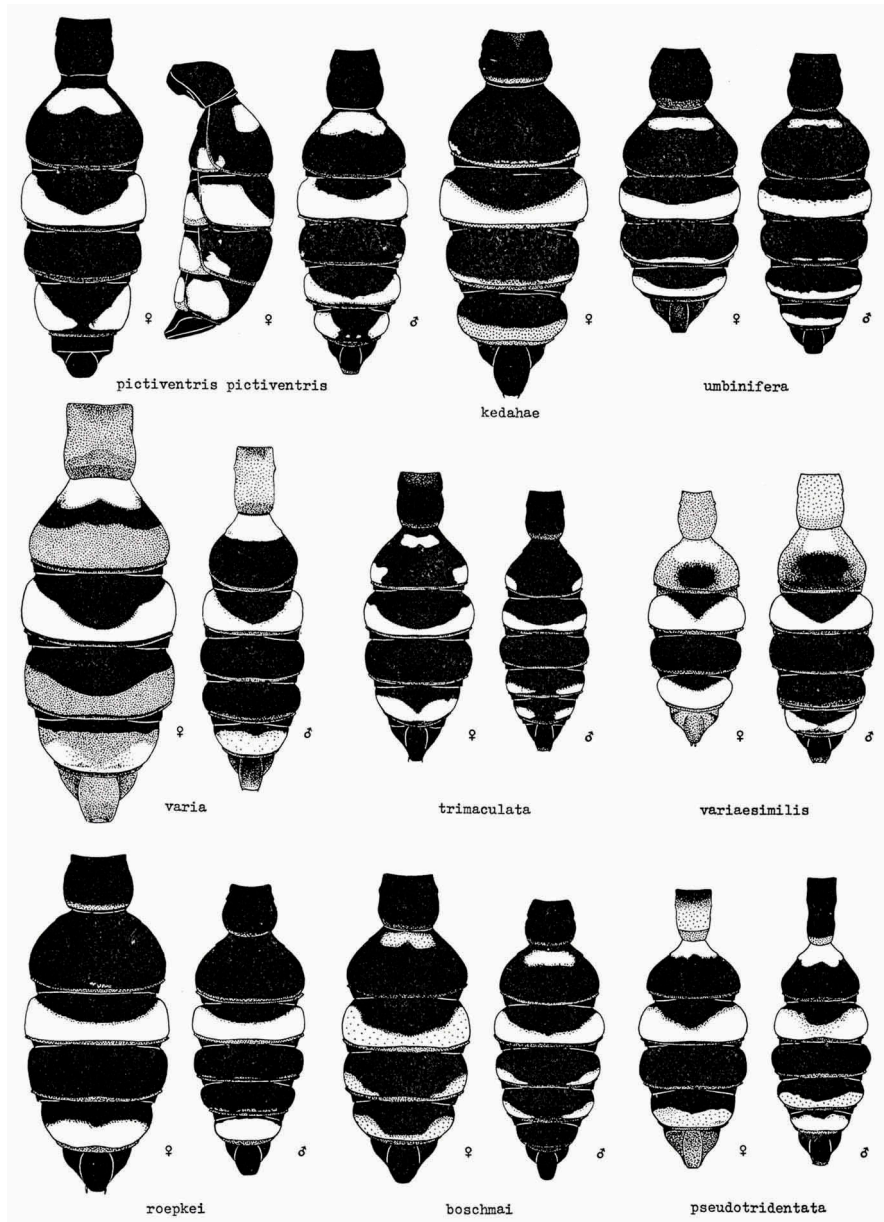


Fig. 2. Gastral markings of various *Cerceris* species. Shades of red are indicated by dotted areas.

Material. — 1 ♀ Java, leg. Mulié. — West Java, 1 ♀ Banten, Tjilegon, 9 June 1932, J. van der Vecht; 2 ♀ 4 ♂ Batavia (= Djakarta), Oct. and Nov. 1907, E. Jacobson; 5 ♀ 7 ♂ environs of Buitenzorg (= Bogor), 250-800 m, including the Agricultural Experiment Garden, Tjilendek (1 ♂ on *Borreria latifolia*), Tjiburial and Tapos. — East Java, 4 ♀ 3 ♂ Malang, April 1935, J. G. Betrem.

Distribution. — Java.

***Cerceris variaesimilis* Maidl (fig. 2)**

Cerceris variaesimilis Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 223, ♀, figs. 6-8 — "Java, Samarang, Jan. 1910, E. Jacobson" (type ♀, Mus. Leiden).

Material. — 1 ♂ Java, leg. Mulié. — West Java, 1 ♂ Batavia (= Djakarta), May 1908, E. Jacobson; 2 ♂ Bogor, Tjiburial, 19 April 1935, J. van der Vecht; 1 ♂ East Priangan, Penandjung, July 1936, Mrs. M. E. Walsh. — Central Java, 1 ♀ Semarang (type). — East Java, 1 ♀ Muneng, 1956, F. H. Hamann; 1 ♂ Malang, March 1933, J. G. Betrem. — The Leiden Museum collection also contains 1 ♂ collected by me at Serdang, Malaya, 4 March 1949.

Distribution. — Malaya; Java.

***Cerceris roepkei* Maidl (figs. 1, 2)**

Cerceris roepkei Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 225, ♀ — "Java, Buitenzorg, W. Roepke" (type ♀, Mus. Leiden).

Bionomics. — An inhabitant of cultivated areas, in the plains and on mountain slopes up to about 800 m above sea level. A few males were collected on flowers of cultivated plants (Bogor, 1 ♂ on *Antigonon*, Jan. 1932, M. A. Lieftinck, 1 ♂ on *Nephelium lappaceum* L., Aug. 1935, J. van der Vecht).

Material. — 1 ♂ Java, leg. Mulié. — West Java, 1 ♀ 1 ♂ Banten, Tjilegon, 9 June 1932, J. van der Vecht; 1 ♀ Buitenzorg (= Bogor), 1919, W. Roepke (type, presented to Mus. Leiden by the Laboratory of Entomology, Wageningen); 1 ♂ Bogor, 29 Jan. 1932, M. A. Lieftinck; 2 ♀ 14 ♂ Bogor and environs (Tjiburial, Kretek, Mt. Tjampea, Tjiapus), 240-700 m, throughout the year, 1928-49, J. van der Vecht; 1 ♀ Sukabumi, April 1933, F. Verbeek; 1 ♀ Radjamandala, 350 m, Oct. 1936, Mrs. M. E. Walsh; 1 ♀ Bandung, 700 m, Dec. 1934, E. Jacobson. — Central Java, 1 ♂ Kaliwungu, Aug. 1910, E. Jacobson. — East Java, Malang, 1 ♀ 1 ♂ April 1933, J. G. Betrem, 1 ♀ 1 ♂ 30 Nov. 1956, F. H. Hamann.

Distribution. — Simalur Island; Sumatra; Bangka; Borneo; Java.

Cerceris boschmai sp. n. (figs. 1, 2)

♀ — Similar to *C. roepkei* Maidl (see the differences indicated in the key); gastral tergites 2-5 more finely and less densely punctate, the interspaces generally larger than the punctures.

Black, marked with yellow as follows: mandible except apex, a hexagonal mark on median portion of clypeus (teeth black), contiguous with a broad stripe, somewhat narrowed above, along inner orbit (extending slightly above the antennal sockets), antennal scape beneath, two spots on pronotum (smaller than the distance between them), tegula except dark base and narrow testaceous margin, transverse band on postscutellum. Pattern of gaster: fig. 2; sternites brownish to black, sternite 3 with broad yellow band, more or less interrupted in the middle.

♂ — Mandibles black; median spot on clypeus more or less reduced, separated from the markings at the inner orbits; markings on pronotum and postscutellum smaller or absent; coxae, femora and tibiae extensively infuscated, the hind tibiae black or with yellow ring at base, fore and mid tarsi yellow to pale brownish, hind tarsi dark brown.

Length: ♀ 9-10 mm, ♂ 8-9 mm.

Material (type, allotype and paratypes). — West Java, 1 ♀ 2 ♂ Banten, Tjilegon, 9 June 1932, J. van der Vecht (type ♀ and allotype ♂, Mus. Leiden); 3 ♂ Batavia (= Djakarta), Oct.-Nov. 1907, E. Jacobson; 3 ♂ Buitenzorg (= Bogor), Tjiburial, 22 Nov. 1936, J. van der Vecht. — Central Java, 1 ♂ Ambarawa, leg. Ludeking. — East Java, 1 ♀ Patjitan, 12 Dec. 1937, J. van der Vecht; 1 ♂ Malang, March 1933, J. G. Betrem. — Kangean Islands, 1 ♂ Tembajangan, Febr. 1936, Mrs. M. E. Walsh; 1 ♂ 2 ♀ Bujutan, 23 Aug. 1954, A. Hoogerwerf.

Distribution. — Java; Kangean Islands. Closely related forms occur in Celebes and in the Lesser Sunda Islands.

Cerceris pseudotridentata Maidl (figs. 1, 2)

Cerceris pseudotridentata Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 227, ♀, figs. 15-17 — "Java, Nongkodjadjar, Jan. 1911, E. Jacobson" (type ♀, Mus. Leiden).

In the type the pronotal band is rather widely interrupted; the scutellum is black with on each side a small yellow spot. A female from Puntjak has the scutellum as in the type, but the pronotal band is entire. In the other females examined by me pronotum and scutellum have a complete yellow band, or the latter is more or less reddish to blackish in the middle.

Bionomics. — A rather rare inhabitant of mountain forests, 1000-1400 m. The prey is unknown.

Material. — West Java, 1 ♀ 1 ♂ Puntjak on Mt. Gede, 1400 m, April

and June 1948; 2 ♀ 1 ♂ Tjipanas on Mt. Gedeh, 1200 m, 1955-6, F. H. Hamann; 1 ♀ Djampang Wetan, Mt. Beser, March 1938, Mrs. M. E. Walsh. — East Java, 1 ♀ Nongkodjadjar (type), 2 ♀ 10 ♂ Nongkodjadjar and environs (Djunggo, Tlogosari and Taman, 1000-1200 m), 1930-5, J. G. Betrem; 1 ♀ 3 ♂ Pudjon, Tjaba Rondo, June 1931, J. G. Betrem; 1 ♂ Sarangan on Mt. Lawu, June 1932, J. G. Betrem. — Sumatra, 1 ♀ Alahan Pandjang, East of Padang, Sept. 1877, Sumatra Expedition; 1 ♂ Kaban-djahe, Deli, 1100 m, 26 Dec. 1954, J. van der Vecht; 1 ♀ "Sumatra" (Naturhistorisches Museum, Wien).

Distribution. — Sumatra; Java.

***Cerceris luchti* sp. n. (figs. 1, 4)**

♀ — Easily distinguished by the peculiar shape of the clypeus (fig. 1); clypeus with some scattered punctures, frons finely and densely punctate, vertex more coarsely and less densely punctate. Mesoscutum and scutellum rather dull, very finely and densely punctate, with a few coarser punctures; mesepisternum dull, granulate, with some indistinct, coarse and shallow punctures; basal area of propodeum moderately shiny, indistinctly and very superficially rugose (more distinctly at the lateral margins), with sparse and very fine and inconspicuous puncturation; the adjoining areas more coarsely, but sparsely, punctate. Gastral segments dull, finely granulate, except for the first tergite and the second sternite which are rather shiny; tergites 1 to 4 sparsely covered with moderately coarse punctures, least distinct at the base of tergite 2 and on tergite 4.

Colour pattern similar to that of *C. tridentata* and *pseudotridentata*; black, with the following parts yellow: greater part of mandibles and clypeus, a broad line at inner orbits, a line on antennal scape (flagellum pale ferruginous beneath), the interantennal carina, a small spot behind each eye, near the top; two spots on pronotum and two on propleura, a small spot at anterior margin of tegulae, a spot on mesepisternum below the tegulae, a band on postscutellum, two large marks on propodeum; markings (orange-yellow) of gastral tergites as in fig. 4 (note the line at the sides of tergite 2; tergite 6 in some specimens with irregular orange spot on each side); a spot in each posterior angle of sternite 2, and a band, narrowed and often more or less interrupted in the middle, on sternite 3, a spot on trochanters (largest on hind legs), the greater part of tibiae I, a line on tibia II, and tarsi I and II (the latter partly pale brownish). Wings hyaline with conspicuous cloud extending from stigma through marginal cell to wing tip.

♂ — Clypeus moderately convex, the median portion produced, truncate anteriorly, with only a very faint indication of a median tooth; first gastral

segment much longer and thinner than in the female. Colour pattern almost as in the ♀; trochanters entirely yellow and hind tibiae with yellow mark on inner side at base, but some other markings (on postscutellum and on tergite 2) more or less reduced.

Length: ♀ 7-8 mm, ♂ 6-7 mm.

Bionomics. — Inhabitant of mountain forests, occurring throughout the year, but rarely numerous.

Material (type, allotype and paratypes). — West Java, Mount Gedeh, 3 ♀ 1 ♂ Tapos, 800 m, Febr., Aug., Dec., 1932-6, 3 ♀ 1 ♂ Tjibodas, 1400 m, April, May, Nov., 1935-40 (incl. holotype: ♀ 24 May 1935 and allotype: ♂ 18 May 1935), 1 ♀ Puntjak, 1450 m, 5 June 1948, J. van der Vecht; 9 ♀ 3 ♂ Mount Papandajan, 1700 m, 25 June 1929, J. van der Vecht. — East Java, 1 ♀ 1 ♂ Idjen, 1600 m, Kendeng, 26 June 1939, Mrs. A. Lucht.

Distribution. — Java.

***Cerceris vulcanica vulcanica* sp. et subsp. n. (figs. 1, 3)**

♀ — Distinguished from the related species by the absence of coarse punctures on the gastral tergites 2-5, which have only an exceedingly fine and dense basic puncturation. Clypeus sparsely punctate; sides of face more densely punctate; frons and vertex densely rugosely punctate, the punctures varying in size, largest between the ocelli and the eyes. Mesoscutum only slightly shiny, very finely and densely punctate; scutellum convex, less densely punctate and more shiny; mesepisternum below the transverse groove with some large but ill-defined and very shallow punctures; postscutellum almost impunctate. Basal area of propodeum distinctly, but not very sharply, delimited, finely and sparsely punctate, at the lateral margins with some obliquely transverse striae; remainder of propodeum shiny, sparsely punctate.

Body black; in addition to the yellow markings shown in fig. 3 there is a small spot on the temples, near the top of the eye, a small spot on propleura, one or two spots on mesepisternum (the lower spot often absent), and some rather variable markings on the anterior gastral sternites; legs black, trochanters yellow, femora yellowish at apex, tibia I and II yellow, the latter infuscated at apex, tibiae III dark, yellow at base and beneath, tarsi I and the basal segment of II yellow. Wings subhyaline with dark cloud in and beyond the marginal cell.

♂ — More slender than the ♀ and somewhat more coarsely sculptured, particularly on mesepisternum and propodeum; otherwise very similar. First and second gastral tergites rarely more extensively marked with black, as in fig. 3, the third specimen of the top row.

Length: ♀ 8.5-10 mm, ♂ 7-9 mm.

Bionomics. — Rather common in mountain forests.

Material (type, allotype and paratypes). — West Java, Mount Gedeh, 2 ♀ Tjisarua, 1100 m, 21 May 1950, J. van der Vecht; 1 ♀ 9 ♂ Puntjak, 1450 m, May and June 1948, March 1949, J. van der Vecht; 3 ♀ 11 ♂ Tjibodas, 1450 m, 14-22 May 1935, J. van der Vecht and E. van der Vecht-B. (incl. holotype and allotype, ♀ 14 May and ♂ 18 May, resp.); 1 ♀ do., 25 Nov. 1938, 1 ♀ do., 21 April 1940, 1 ♀ do., 9 April 1950, J. van der Vecht; 1 ♀ Tjibeureum, 1600 m, 29 June 1937, J. van der Vecht. Djampang, 2 ♀ 1 ♂ Mt. Malang, Febr. 1938, Mrs. M. E. Walsh.

Cerceris vulcanica patuhana subsp. n. (fig. 3)

♀♂ — Distinguished from the nominate subspecies by the almost entirely black gastral petiole and by the presence of a broad dark band on the second gastral tergite. The spot on the lower half of the mesepisternum is lacking in 2 ♀ and 1 ♂ and very small in a third female, but it is well developed in a fourth one. In one female the band on the scutellum is divided by an irregular median line.

Material. — 4 ♀ 1 ♂ (type ♀, allotype ♂, and paratypes) Mt. Patuha, Rantjabali, Sept. 1941, J. van der Vecht.

Cerceris vulcanica merbabuana subsp. n. (fig. 3)

♀♂ — Markings pale, maize yellow (Ridgway's Color Standards, 1912, pl. IV), against buff- to apricot-yellow in the nominate subspecies. Lamina of clypeus truncate anteriorly or only shallowly emarginate. Gastral petiole black above, with pale yellow lines at the sides (absent in the ♂) and at the apex of the tergite; the sternite mainly yellow in the ♀, in the ♂ black or with yellow spot at the posterior margin.

Material. — 3 ♀ 9 ♂ (type ♀, allotype ♂, and paratypes) Mt. Merbabu, Kopeng, May 1939, Oct. 1939, and July 1941, J. G. Betrem.

Cerceris vulcanica ardjunae subsp. n. (fig. 3)

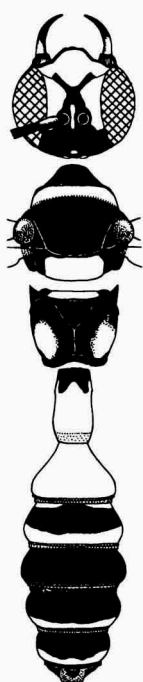
♀♂ — Scutellum with small yellow spot on each side, or entirely black. Gastral petiole mainly black; second tergite yellow with transverse black band (3 ♀ 1 ♂) or entirely yellow (2 ♂); fourth tergite without apical band.

Material. — 3 ♀ 3 ♂ (type ♀, allotype ♂, and paratypes) Mt. Ardjuna, 6000-7000 ft., Jan. 1936, Mrs. M. E. Walsh.

Fig. 3. Colour patterns of *Cerceris vulcanica* sp. n. from four mountains in Java. Local variation of colour pattern is shown in two figures of *C. v. vulcanica* ♂ and two of *C. v. ardjunae* ♂.



vulcanica vulcanica ♀
Mt. Gedeh, Tjibodas



vulcanica vulcanica ♂
Mt. Gedeh, Tjibodas



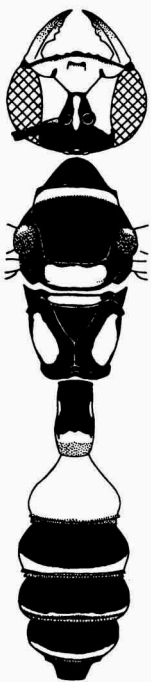
vulcanica vulcanica ♂
Mt. Gedeh, Puntjak



vulcanica patuhana ♀
Mt. Patuha



vulcanica patuhana ♂
Mt. Patuha



vulcanica merbabuana ♀
Mt. Merbabu, Kopeng



vulcanica merbabuana ♂
Mt. Merbabu, Kopeng



vulcanica ardjuna ♀
Mt. Ardjuna



vulcanica ardjuna ♂
Mt. Ardjuna



vulcanica ardjuna ♂
Mt. Ardjuna

Cerceris latidens Cameron (figs. 1, 4)

Cerceris latidens Cameron, 1902, Jl. Straits Branch Roy. As. Soc., vol. 37, p. 99, ♀ — "Kuching", Sarawak, Borneo (type in British Museum).

Bionomics. — A rare inhabitant of forests in the lowlands and the low mountains.

Material. — West Java, 1 ♀ Wijnkoop Bay, Dec. 1936, Mrs. M. E. Walsh; 1 ♂ Djampang, Mt. Tjisuru, Nov. 1936, Mrs. M. E. Walsh. — Borneo, 1 ♀ Sarawak, Kuching, 15 Sept. 1900 (syntype, Mus. Leiden).

Distribution. — Borneo; West Java.

Cerceris tridentata Maidl (figs. 1, 4)

Cerceris tridentata Maidl, 1926, Zoöl. Meded. Leiden, vol. 9, p. 226, ♀ — "Sumatra, Oct. 1913, Kloof v. Harau, E. Jacobson" (type in Mus. Leiden).

Bionomics. — Apparently a rather rare lowland species. Three of the females from Seneng were taken on flowers of *Tectona grandis*; the male from Bangka was found on flowers of *Embelia ribes*.

Material. — Central Java, 7 ♂ Semarang, Seneng, Jan.-March 1931, in teak forest, L. G. E. Kalshoven. — Sumatra, 1 ♀ Harau cleft, Oct. 1913, E. Jacobson (type). — Bangka Island, 1 ♂ Batu Rusa, 22 Febr. 1932, J. van der Vecht.

Distribution. — Sumatra; Java; Bangka.

Cerceris hilbrandi sp. n. (fig. 4)

♀ — Characterized by the peculiar shape of the mandibles and the clypeus (fig. 4); the anterior portion of the clypeus is concave, black, shiny and impunctate, the posterior portion is almost flat, slightly concave at the sides, almost entirely yellow, moderately shiny and distinctly punctate, the punctures coarser in the middle than at the sides. Anterior portion of supraclypeal area rather sloping towards the clypeus. Frons and vertex dull, very densely and somewhat rugosely, but not coarsely, punctate.

Mesoscutum and scutellum dull, the puncturation slightly finer than on the vertex; mesepisternum more coarsely, but superficially punctate, in the middle irregularly reticulately rugose; postscutellum finely and sparsely punctate; basal area of propodeum almost dull, finely longitudinally striate, with some traces of punctures between the striae; the sculpture of the remainder of the propodeum similar to that of the mesepisternum, but less coarse.

First gastral tergite strongly convex, rather shiny; second sternite with two small tubercles at a short distance from the base; tergites 2-5 dull, with a very fine basic puncturation and some scattered larger punctures, most distinct on the sides of the segments and on the posterior half of tergite 5;

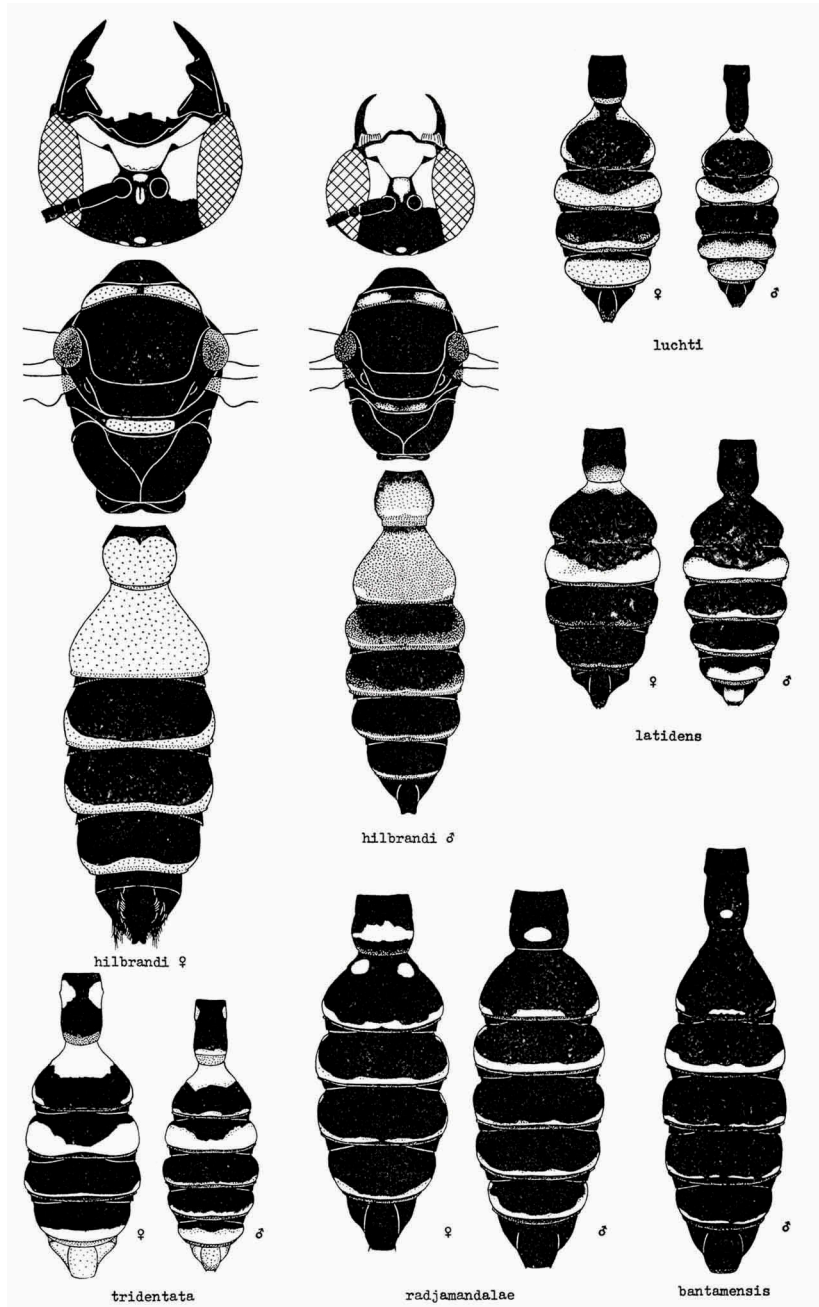


Fig. 4. Colour pattern of *Cercheris hilbrandi* (dotted areas represent shades of ochreous to brown) and gastral markings of other *Cercheris* species.

the sternites rather shiny; tergite 6 shiny and coarsely punctate on the sides, the pygidium dull, densely and finely rugosely punctate, its apex bilobate.

Markings of face yellow, of thorax and gaster ochreous to pale brown; mesepisternum with small yellowish spot in upper part, the greater part of gastral sternite 2 and the posterior margins of sternites 3-5 brownish; legs dark brown, but apex of femora, all tibiae, and the fore and mid tarsi, ochreous. Wings subhyaline, with ill-defined dark band at anterior margin of fore wings.

♂ — Similar to the ♀, but the ochreous markings darker, the spots on the pronotum mainly yellow, and the gastral tergites 1-6 with narrow apical yellow band, on 2-6 interrupted or almost linear in the middle; all tibiae with yellow streak; mesepisternum black; tarsi pale brown. Second gastral sternite without tubercles, but with some irregular and superficial rugosities; apical half of sixth sternite on each side with some golden pubescence; pygidium irregularly punctate, truncate at apex, the seventh sternite shallowly emarginate.

Length: ♀ 12-13 mm, ♂ 10 mm.

Bionomics. — A mountain species, occurring in or near well forested areas. The specimen collected at Tjibodas had its nest in the steep bank of a fairly sunny path; two cells were found to contain 6 and 7 Curculionidae, belonging to two unidentified species of the genus *Cyphicerinus* (according to Mr. R. T. Thompson, British Museum (Natural History), London).

Material. — 1 ♀ Sindanglaja on Mt. Gedeh, 7 Sept. 1934, 1200-1450 m (type); 1 ♀ Tjibodas on Mt. Gedeh, 1450 m, 22 May 1935 (paratype); 1 ♂ Pengalengan, 1400 m, 18 July 1932 (allotype), all leg. J. van der Vecht.

***Cerceris radjamandalae* sp. n. (figs. 1, 4)**

♀ — Apparently related to *C. shelfordi* Turner, 1912, from Borneo, but in that species the lamina of the clypeus is bluntly bidentate and the first gastral segment is nearly twice as broad as long.

Head very wide, strongly produced behind the eyes, the posterior ocelli more than $2\frac{1}{2}$ times as far from the back of the head as from each other; eyes strongly diverging towards the clypeus; lamina of clypeus small; mandibles with a single large and blunt tooth on inner side. Clypeus finely and sparsely punctate; frons and vertex densely and rather coarsely punctate (except for some small areas above the antennae and near the lateral ocelli); mesoscutum and scutellum dull, the former irregularly and superficially longitudinally punctato-rugose, the scutellum with only a few indistinct punctures at the posterior margin. Mesepisternum with projecting tubercle which is compressed in vertical direction; upper part of mesepisternum with some

coarse vertical ridges, lower part coarsely rugosely punctate; postscutellum dull, impunctate; basal area of propodeum dull, with some superficial ridges, oblique on basal half, transverse posteriorly, the dorsal lateral areas coarsely but superficially rugoso-punctate, the lateral and posterior areas almost impunctate.

First gastral tergite coarsely but not very densely punctate, the other segments dull, with a very fine basic punctation, and with only a few coarser punctures on the sides.

Black; the following parts yellow: mandibles (apex dark), clypeus (apex of lamina and small areas at base dark), two large marks at inner orbits, a line on interantennal carina, the under side of the antennal scape, two oblique spots on vertex and two larger ones behind the eyes (on upper part of temples), two transverse spots on pronotum, tegulae (with brown spot in the middle), a large spot on mesepisternum (including the tubercle), a band on basal half of scutellum, a narrower band on postscutellum (both divided by dark median line), a curved band on each side of the propodeum running from lateral angle of basal area along lower margin and then back to posterior angle of basal area; apical bands of gastral tergites 1-5 (see fig. 4), those of tergites 2-5 extending laterally to near the anterior margin; two small spots at base of tergite 2, a large spot in lateral angles of sternites 2-4; legs dark brown, variegated with yellow. Wings subhyaline with dark cloud in and beyond the marginal cell.

♂ — Median portion of clypeus truncate, only very slightly arcuate, with bluntly rounded sides; clypeus sparsely and finely punctate; head and thorax more coarsely sculptured than in the ♀; ultimate antennal segment strongly curved, with truncate apex; mesepisternum without tubercle; basal area of propodeum not distinctly transversely rugose at apex; pygidium broad, dull, irregularly punctate; mid tibiae conspicuously swollen, thickest a little below the middle. Spots on vertex absent, on temples very small; thoracic markings strongly reduced; spots on pronotum and scutellum small, but band on postscutellum well developed, band on propodeum reduced to two spots (in allotype) or absent (in paratype).

Length: ♀ 11 mm, ♂ 9-10 mm.

Material. — West Java, 1 ♀ Radjamandala, Oct. 1936, Mrs. M. E. Walsh (type); 1 ♂ Djampang, Tjikarang, Mrs. M. E. Walsh (paratype); 1 ♂ Mt. Besser, May 1936, Mrs. M. E. Walsh (allotype).

***Cerceris bantamensis* sp. n. (fig. 4)**

♂ — Antenne gradually dilated towards the eleventh segment, which is distinctly wider than long (14 : 11), the ultimate segment distinctly curved,

gradually narrowed towards the roundly truncate apex. Mesepisternum coarsely punctate, but at least on lower half with distinct interspaces between the punctures. Basal area of propodeum longitudinally striate, with 6-7 striae on each side. Gastral petiole coarsely punctate, the other segments shiny, practically impunctate. Mid tibiae much less swollen than in the preceding species.

Yellow markings mainly as in *C. radjamandalae* ♂, but the spot at base of mandibles small, spots on pronotum about as long as the space between them, propodeum with two small spots at base and two large ones at apex; gastral tergites: see fig. 4; second sternite with two large yellow spots, sternite 3 with broad yellow band, slightly narrowed towards the middle and here divided by an ill-defined brownish line; yellow markings of legs slightly less extensive. Antennae not ferruginous beneath.

Length: ♂ 11 mm.

This is perhaps the unknown male of *C. ferox* Smith, described from Sumatra and also known from Malaya, but this must remain uncertain so long as the sexes have not been collected together.

Material. — South West Java, 1 ♂ Bantam, Malingping, in primary forest, 22-24 March 1940, J. van der Vecht (type).

LITERATURE

- ARNOLD, G., 1931. The Sphegidae of South Africa, part XV. — Ann. Transvaal Mus., vol. 14, pp. 135-220.
- , 1942. Systematic notes on African species of *Cerceris* and descriptions of new species. — Jl. Ent. Soc. S. Africa, vol. 5, pp. 1-125, 2 pls.
- BEAUMONT, J. DE, 1950. Les *Cerceris* de la faune Française. — Ann. Soc. Ent. France, vol. 119, pp. 23-80.
- , 1951. Contribution à l'étude de *Cerceris* nord-africains. — Eos, vol. 27, pp. 299-408.
- , 1958. *Cerceris* de Grèce et de Chypre. — Mitt. Schweiz. Ent. Ges., vol. 31, pp. 270-290.
- BINGHAM, C. T., 1897. Fauna of British India, Hymenoptera, vol. 1 (*Cerceris*: pp. 299-313).
- BRAUNS, H., 1926. The Ethiopian *Cerceris* species. — Ann. Transvaal Mus., vol. 11, pp. 268-337.
- IWATA, K., 1939. Habits of some solitary wasps in Formosa. — Trans. Nat. Hist. Soc. Formosa, vol. 29, pp. 39-47, 67-74, 119-128, 161-178, 10 figs.
- MAIDL, F., 1926. Neue Indo-Malayische *Cerceris*-Arten. — Zoöl. Meded. Leiden, vol. 9, pp. 221-238.
- MOCHI, A., 1939. Revisione delle specie egiziane del genere *Cerceris* Latr. — Bull. Soc. Fouad I Ent. Cairo, vol. 22 (1938), pp. 136-228.
- PAGDEN, H. T., 1934. Biological notes on some Malayan Aculeate Hymenoptera II, with descriptions of new species. — Jl. Fed. Mal. St. Mus., vol. 17, pp. 467-486.
- TSUNEMI, K., 1961. Studies on *Cerceris* of North Eastern Asia. — Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, Nat. Sci., no. 11, pp. 1-72.
- TURNER, R. E., 1912. A monograph of the wasps of the genus *Cerceris* inhabiting British India. — Jl. Bombay Nat. Hist. Soc., vol. 21, pp. 476-516, 794-819, 4 pls.